



US008526577B2

(12) **United States Patent**
Idler et al.

(10) **Patent No.:** **US 8,526,577 B2**
(45) **Date of Patent:** **Sep. 3, 2013**

(54) **SYSTEM AND METHOD TO ACCESS
CONTENT FROM A SPEECH-ENABLED
AUTOMATED SYSTEM**

(75) Inventors: **Julie A. Idler**, Bartlett, IL (US); **Robert R. Bushey**, Cedar Park, TX (US); **Benjamin A. Knott**, Beaverscreek, OH (US)

(73) Assignee: **AT&T Intellectual Property I, L.P.**, Atlanta, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2483 days.

5,555,299 A	9/1996	Maloney et al.
5,590,186 A	12/1996	Liao et al.
5,652,789 A	7/1997	Miner et al.
5,754,639 A	5/1998	Flockhart et al.
5,754,978 A	5/1998	Perez-Mendez et al.
5,884,262 A *	3/1999	Wise et al. 704/270.1
5,923,745 A	7/1999	Hurd
5,940,476 A	8/1999	Morganstein et al.
5,946,388 A	8/1999	Walker et al.
5,953,704 A	9/1999	McIlroy et al.
5,999,965 A	12/1999	Kelly
6,002,689 A	12/1999	Christie et al.
6,002,760 A	12/1999	Gisby
6,003,011 A	12/1999	Sarin et al.
6,049,594 A	4/2000	Furman et al.
6,118,866 A	9/2000	Shtivelman

(Continued)

FOREIGN PATENT DOCUMENTS

EP	0 424 015 A2	4/1991
EP	0 424 015 A3	4/1991

(Continued)

(21) Appl. No.: **11/212,939**

(22) Filed: **Aug. 25, 2005**

(65) **Prior Publication Data**

US 2007/0047718 A1 Mar. 1, 2007

(51) **Int. Cl.**
H04M 1/64 (2006.01)

(52) **U.S. Cl.**
USPC **379/88.04**; 379/88.17; 370/352

(58) **Field of Classification Search**
USPC 379/265.02-266.04, 88.04, 88.17
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,953,204 A	8/1990	Cuschleg, Jr. et al.
4,967,405 A	10/1990	Upp et al.
5,335,269 A	8/1994	Steinlicht
5,455,903 A	10/1995	Jolissaint et al.
5,497,373 A	3/1996	Hulen et al.
5,522,046 A	5/1996	McMillen et al.
5,530,744 A	6/1996	Charalambous et al.

OTHER PUBLICATIONS

U.S. Appl. No. 10/898,722, filed Jul. 23, 2004.

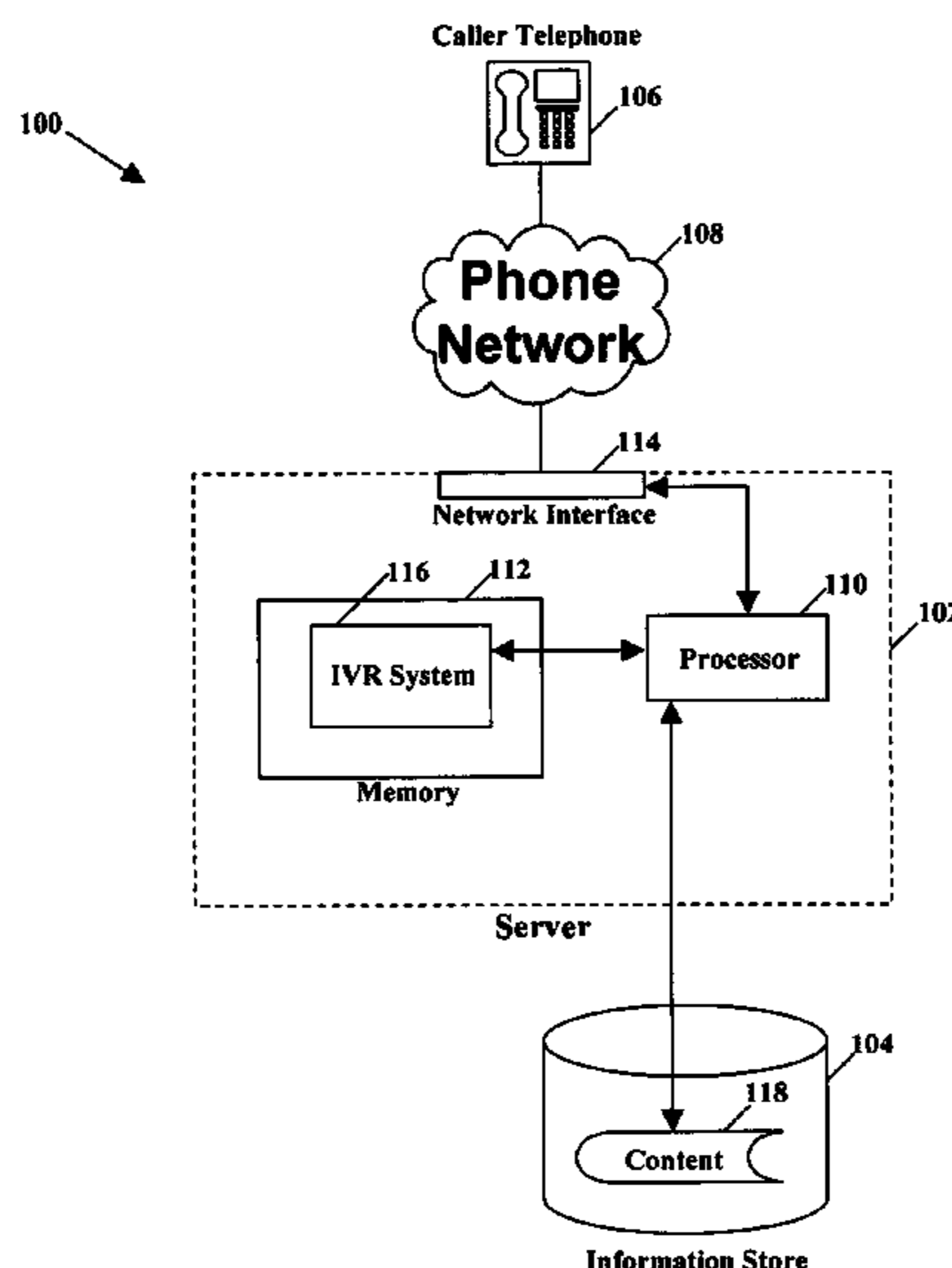
(Continued)

Primary Examiner — Simon Sing
(74) *Attorney, Agent, or Firm* — Toler Law Group, PC

(57) **ABSTRACT**

A method of accessing content at a speech-enabled automated system is disclosed and comprises receiving a verbal input at an interactive voice response system. The interactive voice response system can include one or more table-driven state tables, in which action-objects are embedded. Further, the method can include retrieving content from an information store, wherein the content is associated with the verbal input. The information store is logically external to the interactive voice response system.

29 Claims, 6 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

6,119,101	A	9/2000	Peckover	6,963,983	B2	11/2005	Munson et al.
6,173,266	B1	1/2001	Marx et al.	7,006,605	B1	2/2006	Morganstein et al.
6,173,289	B1	1/2001	Sonderegger et al.	7,131,577	B2 *	11/2006	Obara et al. 235/379
6,173,399	B1	1/2001	Gilbrech	7,277,924	B1 *	10/2007	Wichmann et al. 709/217
6,175,621	B1	1/2001	Begeja	7,660,715	B1 *	2/2010	Thambiratnam 704/244
6,192,398	B1 *	2/2001	Hunt 709/213	7,685,270	B1 *	3/2010	Vermeulen et al. 709/224
6,259,786	B1	7/2001	Gisby	7,881,656	B2 *	2/2011	Khedouri et al. 455/3.01
6,269,153	B1	7/2001	Carpenter et al.	2001/0011211	A1	8/2001	Bushey et al.
6,314,402	B1 *	11/2001	Monaco et al. 704/275	2001/0018672	A1	8/2001	Petters et al.
6,317,439	B1	11/2001	Cardona et al.	2001/0021948	A1	9/2001	Khoury et al.
6,333,980	B1	12/2001	Hollatz et al.	2001/0032229	A1	10/2001	Hulls et al.
6,353,608	B1	3/2002	Cullers et al.	2001/0034662	A1	10/2001	Morris
6,366,658	B1	4/2002	Bjornberg et al.	2002/0046030	A1	4/2002	Haritsa et al.
6,366,668	B1	4/2002	Borst et al.	2002/0057678	A1	5/2002	Jiang et al.
6,381,329	B1 *	4/2002	Uppaluru et al. 379/266.04	2002/0059164	A1	5/2002	Shtivelman
6,385,584	B1	5/2002	McAllister et al.	2002/0059169	A1	5/2002	Quarterman et al.
6,389,400	B1	5/2002	Bushey et al.	2002/0067714	A1	6/2002	Crain et al.
6,400,804	B1	6/2002	Bilder	2002/0087385	A1	7/2002	Vincent
6,400,996	B1	6/2002	Hoffberg et al.	2002/0114432	A1	8/2002	Shaffer et al.
6,405,159	B2	6/2002	Bushey et al.	2002/0133394	A1	9/2002	Bushey et al.
6,414,966	B1	7/2002	Kulkarni et al.	2002/0133413	A1	9/2002	Chang et al.
6,418,424	B1	7/2002	Hoffberg et al.	2002/0135618	A1	9/2002	Maes et al.
6,434,687	B1 *	8/2002	Huppenthal 712/32	2002/0156699	A1	10/2002	Gray et al.
6,442,247	B1	8/2002	Garcia	2002/0165732	A1	11/2002	Ezzeddine et al.
6,510,414	B1	1/2003	Chaves	2002/0196277	A1	12/2002	Bushey et al.
6,519,562	B1	2/2003	Phillips et al.	2003/0026409	A1	2/2003	Bushey et al.
6,529,871	B1	3/2003	Kanevsky et al.	2003/0035381	A1	2/2003	Chen et al.
6,553,113	B1	4/2003	Dhir et al.	2003/0035516	A1	2/2003	Guedalia
6,570,967	B2	5/2003	Katz	2003/0069937	A1	4/2003	Khoury et al.
6,584,180	B2	6/2003	Nemoto	2003/0097428	A1	5/2003	Afkhami et al.
6,587,556	B1	7/2003	Judkins et al.	2003/0103619	A1	6/2003	Brown et al.
6,598,136	B1	7/2003	Norrod et al.	2003/0114105	A1	6/2003	Haller et al.
6,600,736	B1	7/2003	Ball et al.	2003/0118159	A1	6/2003	Shen et al.
6,603,854	B1	8/2003	Judkins et al.	2003/0130864	A1	7/2003	Ho et al.
6,614,781	B1 *	9/2003	Elliott et al. 370/352	2003/0143981	A1	7/2003	Kortum et al.
6,631,186	B1	10/2003	Adams et al.	2003/0144846	A1	7/2003	Denenberg et al.
6,678,360	B1	1/2004	Katz	2003/0144919	A1	7/2003	Trompette et al.
6,678,718	B1	1/2004	Khoury et al.	2003/0156133	A1	8/2003	Martin et al.
6,690,788	B1	2/2004	Bauer et al.	2003/0165223	A1	9/2003	Timmins et al.
6,694,012	B1	2/2004	Posthuma	2003/0187732	A1	10/2003	Seta
6,697,460	B2 *	2/2004	Knott et al. 379/88.22	2003/0187773	A1	10/2003	Santos et al.
6,700,972	B1	3/2004	McHugh et al.	2003/0194063	A1	10/2003	Martin et al.
6,704,404	B1	3/2004	Burnett	2003/0195753	A1	10/2003	Homuth
6,707,789	B1	3/2004	Arslan et al.	2003/0202640	A1	10/2003	Knott et al.
6,714,631	B1	3/2004	Martin et al.	2003/0202643	A1 *	10/2003	Joseph et al. 379/88.18
6,721,416	B1	4/2004	Farrell	2003/0202649	A1	10/2003	Haug, Jr. et al.
6,731,722	B2	5/2004	Coffey	2003/0204435	A1	10/2003	McQuilkin et al.
6,738,473	B1	5/2004	Burg et al.	2003/0228007	A1	12/2003	Kurosaki
6,744,861	B1	6/2004	Pershan et al.	2003/0235287	A1	12/2003	Margolis
6,744,877	B1	6/2004	Edwards	2004/0005047	A1	1/2004	Joseph et al.
6,751,306	B2	6/2004	Himmel et al.	2004/0006473	A1	1/2004	Mills et al.
6,757,306	B1	6/2004	Klish, II et al.	2004/0032862	A1	2/2004	Schoeneberger et al.
6,766,320	B1	7/2004	Wang et al.	2004/0032935	A1	2/2004	Mills et al.
6,775,359	B1	8/2004	Ron et al.	2004/0042592	A1 *	3/2004	Knott et al. 379/88.16
6,778,643	B1	8/2004	Bushey et al.	2004/0044950	A1	3/2004	Mills et al.
6,792,096	B2	9/2004	Martin et al.	2004/0066401	A1	4/2004	Bushey et al.
6,807,274	B2	10/2004	Joseph et al.	2004/0066416	A1	4/2004	Knott et al.
6,823,307	B1	11/2004	Steinbiss et al.	2004/0073569	A1	4/2004	Knott et al.
6,831,932	B1 *	12/2004	Boyle et al. 370/539	2004/0083479	A1	4/2004	Bondarenko et al.
6,832,224	B2	12/2004	Gilmour	2004/0088285	A1	5/2004	Martin et al.
6,842,504	B2	1/2005	Mills et al.	2004/0103017	A1	5/2004	Reed et al.
6,847,711	B2	1/2005	Knott et al.	2004/0109555	A1	6/2004	Williams
6,853,722	B2 *	2/2005	Joseph et al. 379/265.07	2004/0120473	A1	6/2004	Birch et al.
6,853,966	B2	2/2005	Bushey et al.	2004/0125937	A1	7/2004	Turcan et al.
6,859,529	B2	2/2005	Duncan et al.	2004/0125938	A1	7/2004	Turcan et al.
6,871,212	B2	3/2005	Khoury et al.	2004/0125940	A1	7/2004	Turcan et al.
6,873,693	B1 *	3/2005	Langseth et al. 379/201.02	2004/0161078	A1	8/2004	Knott et al.
6,879,683	B1	4/2005	Fain et al.	2004/0161094	A1	8/2004	Martin et al.
6,885,734	B1	4/2005	Eberle et al.	2004/0161096	A1	8/2004	Knott et al.
6,891,932	B2 *	5/2005	Bhargava et al. 379/88.02	2004/0174980	A1	9/2004	Knott et al.
6,895,083	B1	5/2005	Bers et al.	2004/0230438	A1	11/2004	Pasquale et al.
6,901,366	B1	5/2005	Kuhn et al.	2004/0240635	A1	12/2004	Bushey et al.
6,907,119	B2	6/2005	Case et al.	2004/0243568	A1	12/2004	Wang et al.
6,915,246	B2	7/2005	Gusler et al.	2005/0008141	A1	1/2005	Kortum et al.
6,944,592	B1 *	9/2005	Pickering 704/251	2005/0015744	A1	1/2005	Bushey et al.
				2005/0027535	A1	2/2005	Martin et al.
				2005/0041796	A1	2/2005	Joseph et al.
				2005/0047578	A1	3/2005	Knott et al.
				2005/0055216	A1	3/2005	Bushey et al.

2005/0058264	A1 *	3/2005	Joseph et al.	379/88.18
2005/0075894	A1 *	4/2005	Bushey et al.	705/1
2005/0078805	A1	4/2005	Mills et al.	
2005/0080630	A1	4/2005	Mills et al.	
2005/0080667	A1	4/2005	Knott et al.	
2005/0131892	A1	6/2005	Knott et al.	
2005/0132262	A1	6/2005	Bushey et al.	
2005/0135575	A1 *	6/2005	Haskey et al.	379/88.18
2005/0135595	A1 *	6/2005	Bushey et al.	379/265.01
2005/0141692	A1	6/2005	Scherer et al.	
2005/0169441	A1	8/2005	Yacoub et al.	
2005/0169453	A1 *	8/2005	Knott et al.	379/265.02
2005/0201547	A1	9/2005	Burg et al.	
2005/0240411	A1	10/2005	Yacoub	
2006/0285535	A1 *	12/2006	Metcalf et al.	370/352
2007/0047728	A1 *	3/2007	Raju et al.	379/373.02

FOREIGN PATENT DOCUMENTS

EP	0 424 015	B1	4/1991
EP	0 876 652	A4	9/1996
WO	WO 97/26612		7/1997
WO	WO 01/37539	A2	5/2001
WO	WO 01/37539	A3	5/2001
WO	WO 2004/017584		2/2004
WO	WO 2004/049222	A2	6/2004

OTHER PUBLICATIONS

U.S. Appl. No. 10/901,926, filed Jul. 28, 2004.
 U.S. Appl. No. 10/901,925, filed Jul. 28, 2004.

U.S. Appl. No. 10/917,233, filed Aug. 12, 2004.
 U.S. Appl. No. 10/935,726, filed Sep. 7, 2004.
 U.S. Appl. No. 10/999,199, filed Nov. 29, 2004.
 U.S. Appl. No. 11/005,498, filed Dec. 6, 2004.
 U.S. Appl. No. 11/005,494, filed Dec. 6, 2004.
 U.S. Appl. No. 11/010,633, filed Dec. 13, 2004.
 U.S. Appl. No. 11/032,495, filed Jan. 10, 2005.
 U.S. Appl. No. 11/036,204, filed Jan. 14, 2005.
 U.S. Appl. No. 11/036,201, filed Jan. 14, 2005.
 U.S. Appl. No. 11/062,100, filed Feb. 18, 2005.
 U.S. Appl. No. 11/071,068, filed Mar. 3, 2005.
 U.S. Appl. No. 11/086,796, filed Mar. 23, 2005.
 U.S. Appl. No. 11/129,051, filed May 13, 2005.
 U.S. Appl. No. 11/145,513, filed Jun. 3, 2005.
 U.S. Appl. No. 11/173,227, filed Jul. 1, 2005.
 U.S. Appl. No. 11/176,972, filed Jul. 7, 2005.
 U.S. Appl. No. 11/086,794, filed Mar. 22, 2005.
 U.S. Appl. No. 10/996,127, filed Nov. 23, 2004.
 U.S. Appl. No. 10/920,719, filed Dec. 13, 2004.
 U.S. Appl. No. 10/920,720, filed Aug. 18, 2004.
 U.S. Appl. No. 10/948,089, filed Sep. 23, 2004.
 U.S. Appl. No. 10/979,784, filed Nov. 2, 2004.
 U.S. Appl. No. 10/975,023, filed Oct. 27, 2004.
 Ogino, Tsukasa et al., "Technologies for Internet Infrastructure: Eliminating the World Wide Wait," iNet Japan, Jul. 18-21, 2000; www.isoc.org/inet2000/cdproceedings/1g/index.htm; 19 pages.

* cited by examiner

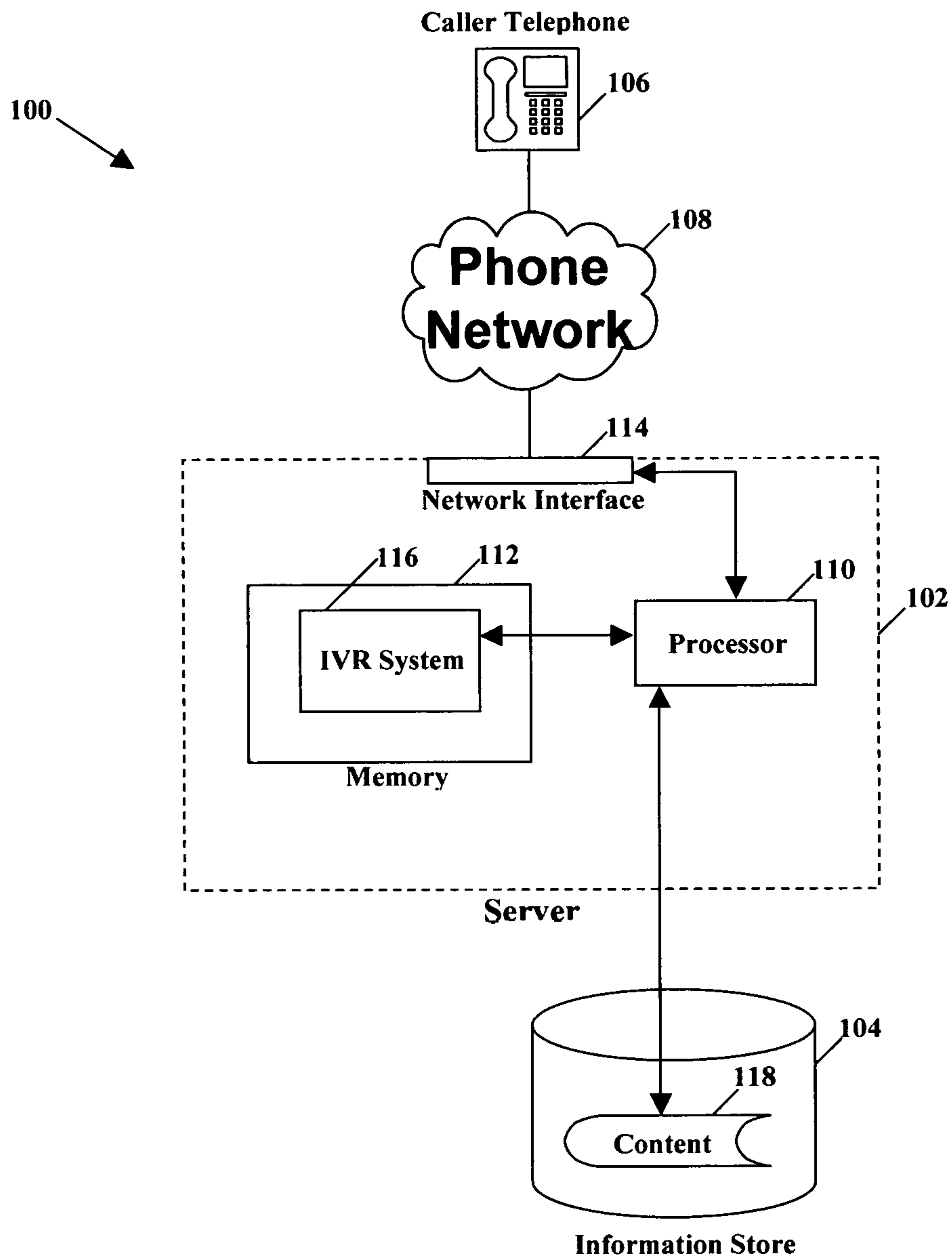


FIG. 1

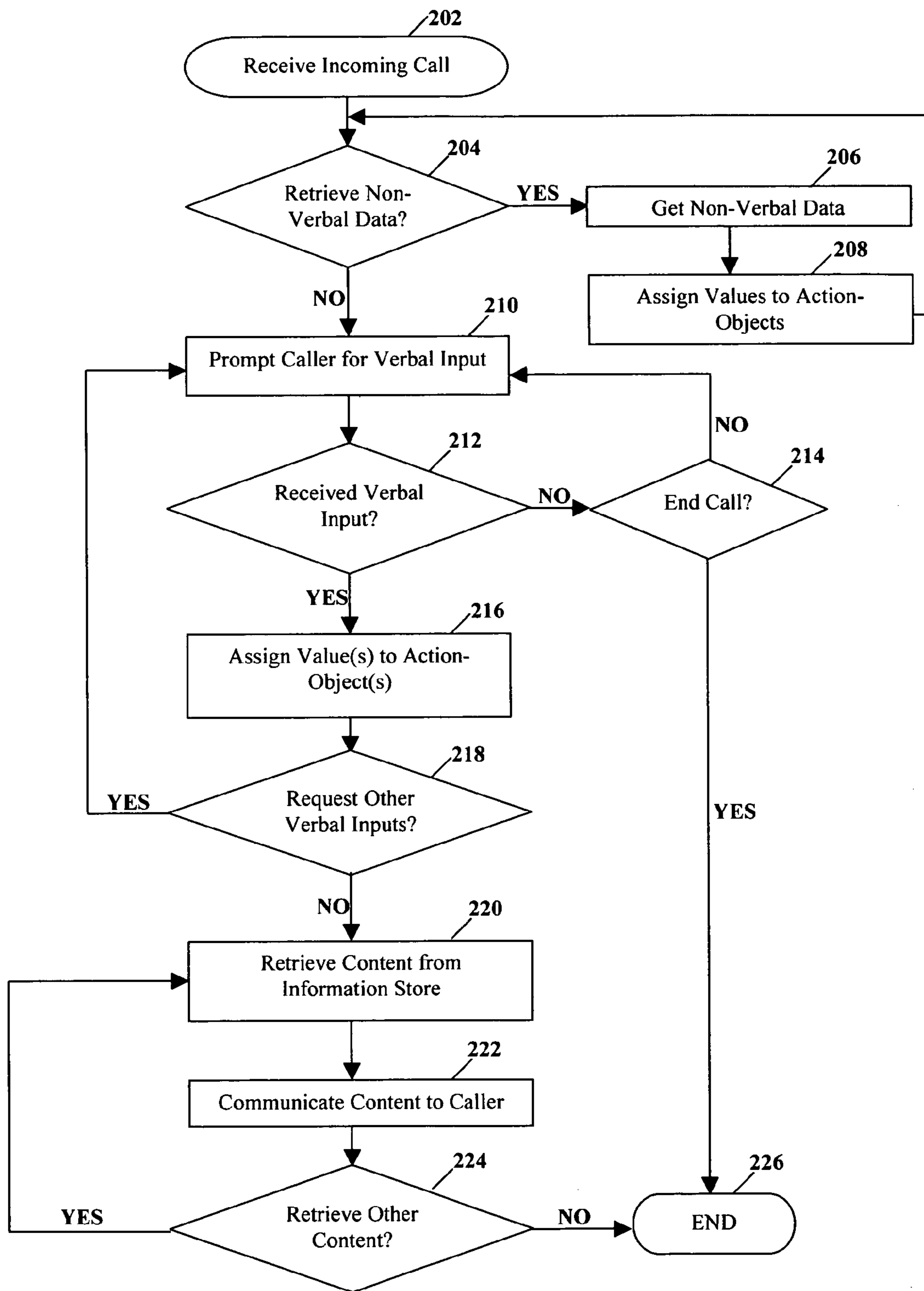


FIG. 2

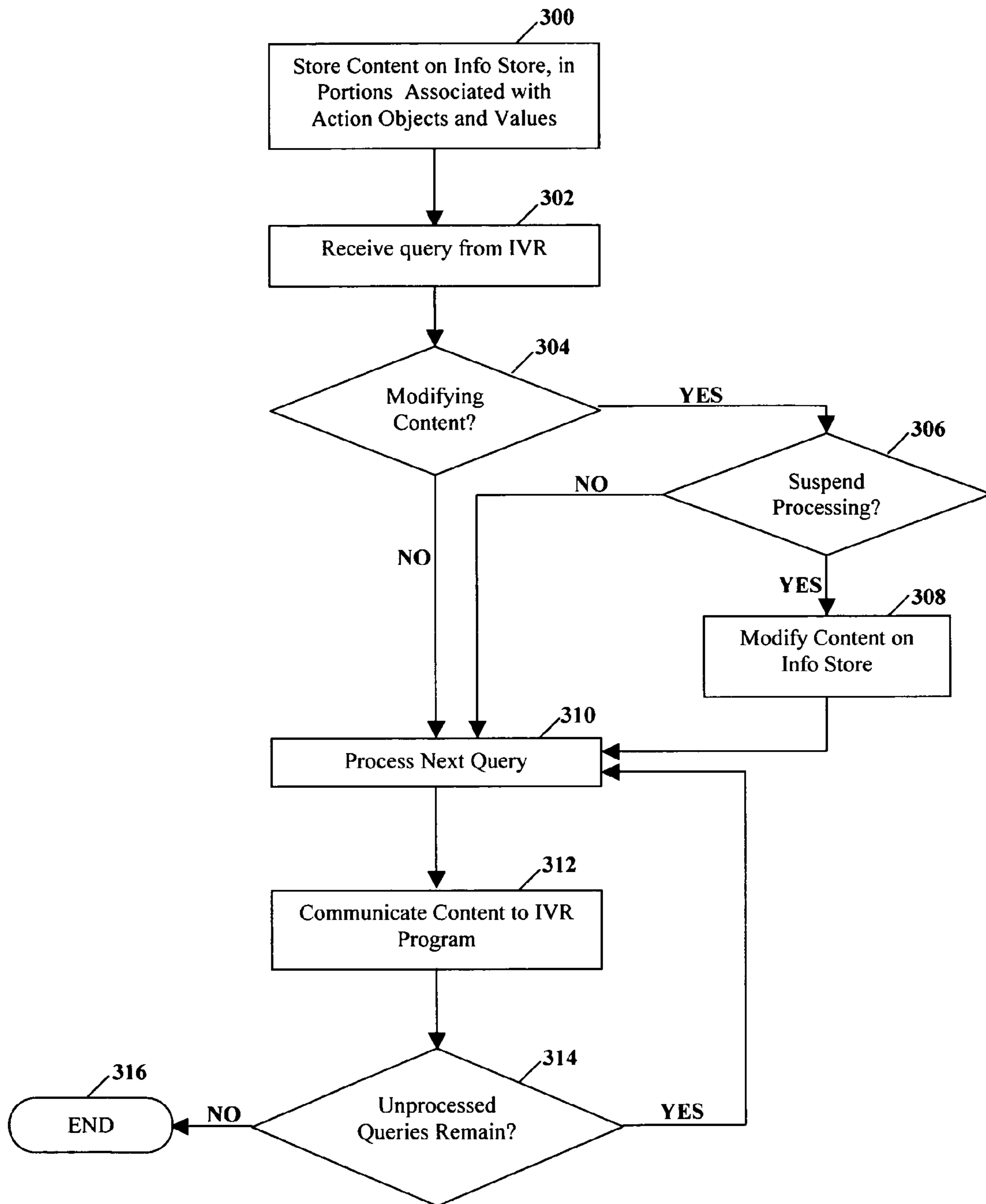


FIG. 3

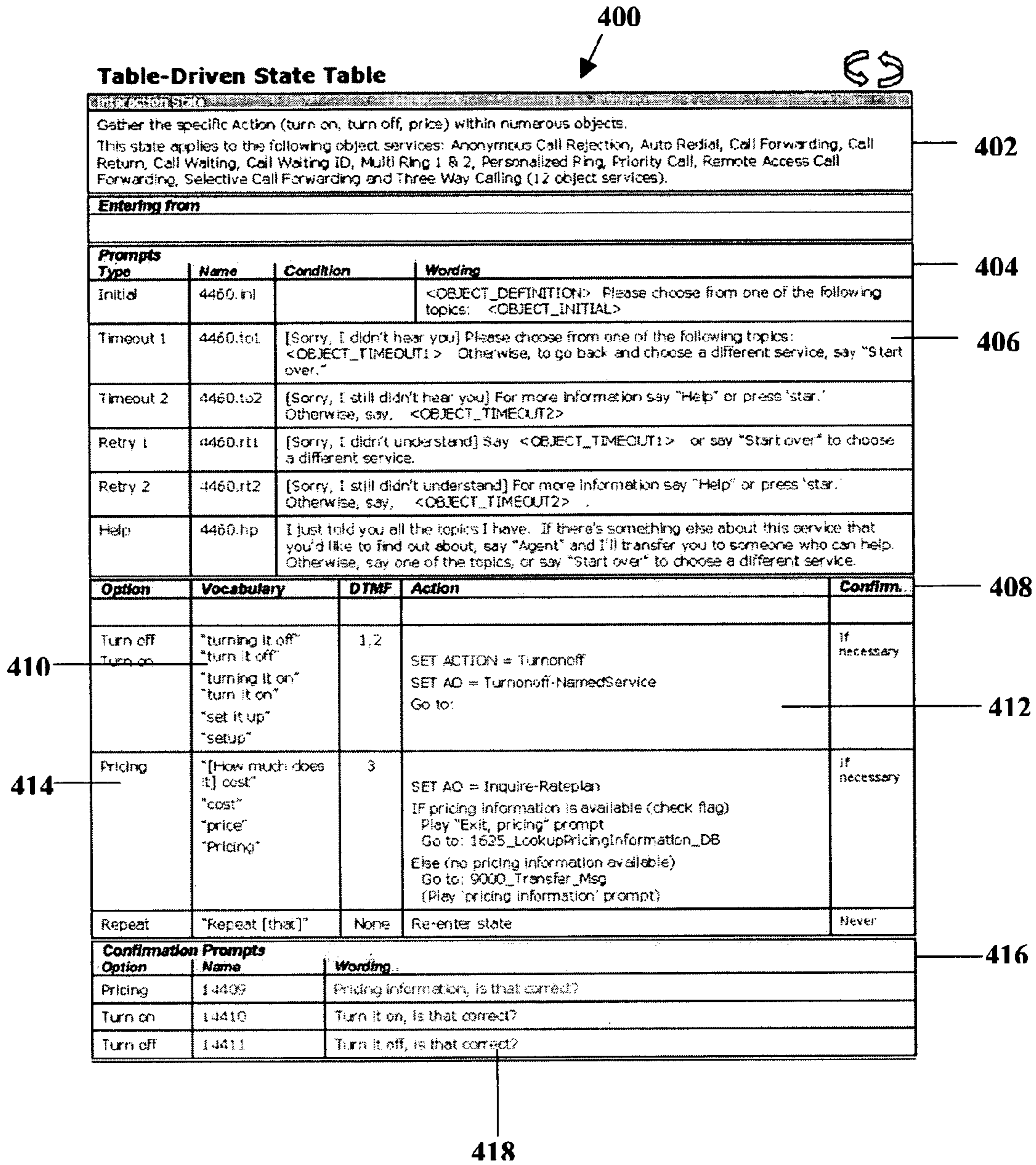


FIG. 4

Content Information Record 500

Action-Object <State>	Action-Object <Language>	Action-Object <Purpose>	Content
TEXAS	ENGLISH	Call notes setup 1 of 3	To set up your Call Notes voice mail for the first time, you'll need to create your own private pass code to replace the temporary pass code we gave you. You'll also need to record your greeting and name announcement.
		Call notes setup 1a of 3 (play this if caller said "No" in 1800)	Here's how you do it. First, to access your Call Notes, pick up the phone and dial your home phone number - even if you're dialing from your home phone. If you live in an area where 10-digit dialing is required, you'll need to include your area code. Next, press the 'star' key when you hear the Call Notes greeting.
		Call notes setup 1b of 3 (Play this if caller said "Yes" in 1800)	Here's how you do it. The cheapest way to get into your mailbox is to dial your CallNotes Access Number. If you don't know your CallNotes Access Number, you can get it by calling one of our customer service agents at 1-800-CalNotes. Once you've dialed your access number, press the 'star' key when you hear the Call Notes greeting.
		Call notes setup 2 of 3	Next, enter your temporary pass code. This is the last 4 digits of your home telephone number. You will then be prompted to enter your own private pass code. This is a number that you make up that is 4 to 10 digits long. Your private pass code ensures that only you can access your information.
ARKANSAS		Call notes get msgs	Once you've accessed your mailbox, press 1 to hear your messages. Your Call Notes will tell you how to repeat, save, or erase your messages. It will also tell you how to reply to a message or forward a copy of a message.
		Call notes retrieve erased message	You can quickly retrieve a message that you erased, if you do it right away. Messages are not actually erased from the system until you exit Call Notes by hanging up the phone. Here's how to listen to a message you erased. First, press 'star' to get to the Call Notes main menu. Then, press 1 to 'listen to your messages again'. Call Notes will play your erased message along with any other messages in your mailbox.

508 points to the first row of the table.
506 points to the second row of the table.
502 points to the third row of the table.
504 points to the content column of the second row.

FIG. 5

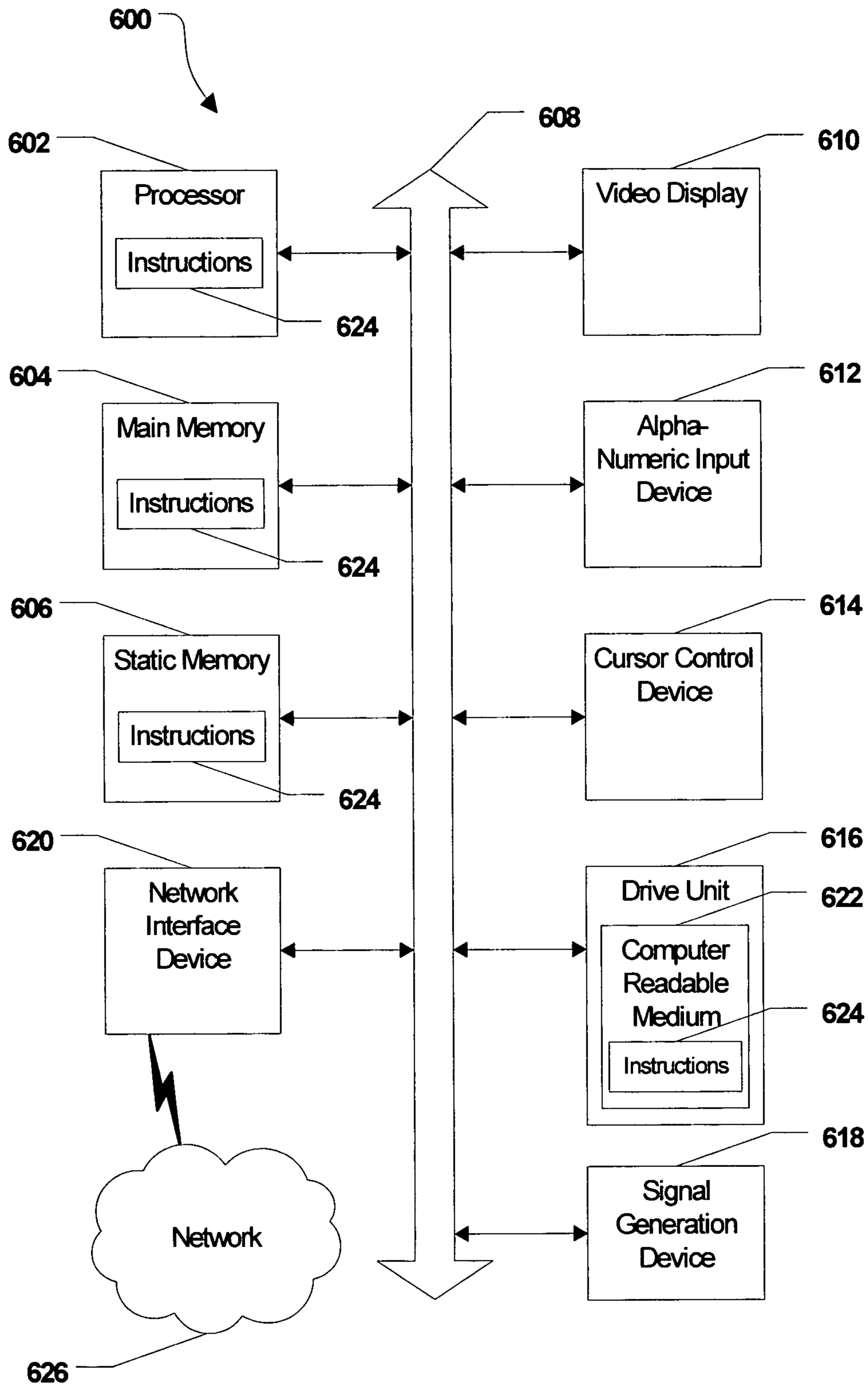


FIG. 6

1

SYSTEM AND METHOD TO ACCESS CONTENT FROM A SPEECH-ENABLED AUTOMATED SYSTEM

FIELD OF THE DISCLOSURE

The present disclosure relates to speech-enabled automated systems.

BACKGROUND

Many companies employ automated systems to provide information that customers request concerning products and services. In order to cut down on costs and provide consistent information, some systems employ automated, self-service call response applications that deliver content to callers. Typically, callers can select from available options, by listening to lists of topics and pressing corresponding touch-tone keys. In recent years, some companies have employed speech-enabled technology that allows callers to respond to prompts with verbal statements. Using speech inputs can save time because callers can avoid listening to choices before making a selection. Speech-enabled self-service systems also reduce costs, by reducing the need for human call center agents.

Rather than taking valuable agent time to explain, for example, how to set up CallNotes, an automated application can perform this service. Customers who purchase products and services need to know how to perform basic functions including setup, turn it on, turn it off, and other such functions. It is fairly common for customers to call agents and ask them to explain how to do such functions. An effective, alternative approach is to provide a self-service application that will provide this information to the caller.

Speech-enabled systems can be constructed using prompts and content that may be embedded in fixed state tables. The fixed state tables can be implemented via computer programs by inserting the text of the prompts and the associated content directly into the computer programs. As the length or logical complexity of the prompts and content increases, the use of fixed state tables becomes inefficient. The resulting computer programs can take up substantial portions of memory, and the extra lines of program code can make the programs increasingly difficult to debug and modify. Hence, the costs associated with utilizing fixed state tables can become prohibitive as the number of prompts and the amount of content increases.

Accordingly, there is a need for an improved system and method of accessing content in a speech-enabled automated system.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram illustrating one embodiment of a system to access content in a speech-enabled automated system;

FIG. 2 is a flow diagram illustrating a method of accessing content in a speech-enabled automated system;

FIG. 3 is a flow diagram illustrating an alternative method of accessing content in a speech-enabled automated system;

FIG. 4 illustrates an example of a table-driven state table;

FIG. 5 illustrates an example of a content information store; and

FIG. 6 is a diagram of an illustrative embodiment of a general computer system.

DETAILED DESCRIPTION OF THE DRAWINGS

The present disclosure is directed to a system and method to access content in a speech-enabled automated system. The

2

method includes receiving a verbal input at an interactive voice response system. The method also includes retrieving content from an information store that is logically external to the interactive voice response system, based on the verbal input. In a particular embodiment, the method can also include communicating a prompt to a caller, prior to receiving the verbal input.

In a particular embodiment, the method may include determining a first action-object and an associated first value, based on the verbal input. In this particular embodiment, the method includes retrieving content associated with the first value from the information store. One or more next action-objects may be determined, based on the verbal input, and content associated with those next values may also be retrieved from the information store. In another particular embodiment, the method may also include receiving a non-verbal input and determining one or more action-objects and associated values, based on the non-verbal input. In this particular embodiment, the method also includes retrieving content associated with the values derived from the non-verbal input.

In a particular embodiment, the method also includes submitting a query to the information store, in order to retrieve content.

In a particular embodiment, the method also includes communicating retrieved content to a caller. The content may comprise table-driven instructional content.

An alternate method of providing content at a speech-enabled automated system includes storing a plurality of content items in an information store. Each of the plurality of content items is associated with at an action-object. Each action-object includes a parameter, such as an action, a call purpose, a product, a service, a location, a language, or any combination thereof. In an illustrative embodiment, services may include call notes, voice mail, call blocking, privacy management, call tracing, call return, auto-redial, call forwarding, call waiting, direct reply, caller ID, or remote access.

The alternate method also includes receiving a query from an interactive voice response system that is logically external to the information store. In a particular embodiment, each query may include an action-object having a value derived from a verbal input received at the interactive voice response system. In another particular embodiment, each query may also include an action-object having a value derived from a non-verbal input received at the interactive voice response system.

In a particular embodiment, the alternate method can also include determining whether a modification of content is in progress at the information store. If such modification is in progress, any processing of the query may be suspended until the modification is complete. If it is determined that such processing is to be suspended, the query is processed after the modification of content is complete.

In a particular embodiment, the alternate method can also include searching one or more records at the information store, for one or more content items. In this particular embodiment, the method also includes retrieving one or more content items from the record or records searched, and communicating those content items to the interactive voice response system. The content may comprise table-driven instructional content.

Various embodiments of the methods described herein may be implemented by a system of managing content at a speech-enabled automated system. The system may comprise a server having a processor and a memory accessible to the processor. In a particular embodiment, the system can also include an interface to communicate with at least one com-

communications network, such as a public switched telephone network, a Voice-over-Internet Protocol network, a cellular telephone network, a mobile telephone network, or a combination thereof.

One or more computer programs may be embedded in the memory, including an interactive voice response system. The interactive voice response system may include instructions to carry out various actions, including processing verbal inputs and retrieving content associated with such verbal inputs from a logically external information store. The interactive voice response system can also include instructions to retrieve content associated with such verbal inputs. In a particular embodiment, the interactive voice response system can also include instructions to submit a query to the information store.

In a particular embodiment, the information store may store information as a plurality of content items. In this particular embodiment, the information store may also include computer-readable instructions to search one or more records at the information store, for one or more content items, and to retrieve such content items from the record or records. In an illustrative embodiment, the information store may include computer-readable instructions to search one or more records at the information store, for at least one of the plurality of content items. In this illustrative embodiment, the information store may also include computer-readable instructions to retrieve, from the record or records, the one or more content items.

Various embodiments of the methods described herein may be implemented by a computer program embedded within a computer-readable medium. The computer program can include instructions to process a verbal input and instructions to retrieve content associated with the verbal input, from an information store that is logically external to the computer program. The computer program can also include instructions to communicate the retrieved content to a caller.

In a particular embodiment, the computer program can include instructions to determine one or more action-objects and one or more values associated with the action-object(s), wherein the one or more values are derived from the verbal input. In this particular embodiment, the computer program can also include instructions to retrieve content associated with the value(s).

In an alternate embodiment, the computer program can also include instructions to process a non-verbal input. In this alternate embodiment, the computer program can also include instructions to determine one or more action-objects and one or more values associated with the action-object(s), wherein the one or more values are derived from the non-verbal input. Moreover, the computer program can also include instructions to retrieve content associated with the value(s).

In a particular embodiment, the computer program can also include instructions to submit at least one query to the information store.

Referring to FIG. 1, a system is shown and is generally designated 100. As shown, the system 100 includes a server 102 that communicates with an information store 104. Additionally, the server 102 can communicate with a telephone 106 via a telephone network 108. In a particular embodiment, the telephone network 108 may include a public switched telephone network (PSTN), an internet protocol (IP) network, a cellular telephone network, a mobile telephone network, or any other network over which voice data may be transmitted.

As depicted in FIG. 1, the server 102 can include a processor 110 and a memory device 112 that is accessible to the processor 110. In a particular embodiment, the server 102

receives calls from caller telephones, such as the caller telephone 106, via a network interface 114 to the telephone network 108. The network interface 114 may be any interface suited to facilitate communication between a server and one or more communication networks. For example, the network interface 114 can facilitate communication between a server and a public switched telephone network (PSTN), an internet protocol (IP) network, a cellular telephone network, a mobile telephone network, or any other telephone network over which voice data may be transmitted.

FIG. 1 further depicts an interactive voice response system including a computer program 116 that is executable by the processor 110 and that is embedded within the memory 112. In a particular embodiment, the server 102 can include one or more additional computer programs that are executable by the processor 110 and that may be stored within the memory 112. In an illustrative embodiment, the interactive voice response system 116 comprises computer-readable instructions to process one or more verbal inputs that are received from a caller and to retrieve content associated with the verbal input or inputs from an information store 104 that is logically external to the interactive voice response system 116.

In a particular embodiment, the information store 104 may be embedded within the memory 112, without being logically integrated with the interactive voice response system 116. In another embodiment, the information store 104 may be physically located at server 102, while being external to the memory device 112 and thus logically external to the interactive voice response system 116. In another embodiment, the information store 104 may be physically located external to the server 102 and also logically external to the interactive voice response system 116.

In an illustrative embodiment, the interactive voice response system 116 communicates with the information store 104 and retrieves selected portions of the content 118. In a particular embodiment, the interactive voice response system 116 retrieves selected portions of the content 118 by submitting one or more queries based on received voice input from a caller to the information store 104. Each query may be based on verbal inputs received from a caller. In a particular embodiment, each query can include one or more action-objects and one or more values that have been assigned to one or more of the included action-objects. Action-objects are described in further detail, with reference to FIGS. 4 and 5.

As indicated in FIG. 1, the information store 104 can store the content 118. In a particular embodiment, the information store 104 may be any storage device or computer program suited to store data and associate the data with fields, attributes, criteria, or the like. In a particular embodiment, the information store can be a database that includes one or more records.

In a particular embodiment, the information store 104 stores the content 118 as a plurality of different content items or portions. Further, each portion of the content 118 may be associated with at least one action-object and with at least one value for each such action-object. Also, in a particular embodiment, the information store 104 may further comprise computer instructions to search one or more records at the information store and retrieve one or more portions of the content 118. In an exemplary embodiment, each portion of content 118 stored at the information store 104 can include one or more types of table-driven content, such as audio data, non-audio data, or instructional content.

In an illustrative embodiment, the interactive voice response system 116 may communicate selected portions or

all of the content **118** that are retrieved from the information store **104** to the caller telephone **106** via the processor **110** and the network interface **114**.

Additionally, the interactive voice response system **116** can include computer-readable instructions that are executable to process one or more verbal inputs. Such computer instructions may include instructions that are executable by the processor **110** to assign a first value that is derived from the verbal input or inputs to a first action-object pair. In a particular embodiment, the computer-readable instructions may retrieve content associated with the first action-object pair and the first value. In a particular embodiment, the computer-readable instructions may assign a next value that is derived from the verbal input or inputs, to a next action-object. Moreover, the instructions may retrieve content associated with the next action-object and the next value.

In another particular embodiment, the interactive voice response system **116** may further include computer-readable instructions that are executable to process one or more non-verbal inputs received during a call and to retrieve content associated with the non-verbal input or inputs from the information store. In a particular embodiment, the computer-readable instructions may assign a second value that is derived from one or more of the non-verbal inputs, to a second action-object. Further, the computer-readable instructions may retrieve content associated with the second action-object and the second value.

In a particular embodiment, the computer-readable instructions may assign an additional value, derived from the non-verbal input or inputs, to an additional action-object. Additionally, the computer-readable instructions may retrieve content associated with the additional action-object and the additional value.

In a particular embodiment, the interactive voice response system **116** may further include one or more table-driven state tables, in which action-objects are embedded. An example of a table-driven state table is described further with reference to FIG. 4.

Referring to FIG. 2, a method to access content in a speech-enabled automated system is shown and commences at block **202**. At block **202**, an incoming call is received at a call center from a caller, such as a customer. The call may be received at a server including a processor and a memory accessible by the processor. An interactive voice response system (the "IVR") may be embedded in the memory and is executable by a processor. The server may comprise additional computer programs. In a particular embodiment, the IVR may further comprise a table-driven state table, in which one or more identified action-objects are embedded.

Moving to decision step **204**, the IVR, or another program embedded in the server memory, determines whether to retrieve non-verbal data. If the IVR or the other program determines to retrieve non-verbal data, the method proceeds to block **206**, and one or more non-verbal inputs are received at the server. In an exemplary embodiment, non-verbal inputs may include any information that is not received from a caller's verbal statements. For example, non-verbal inputs may include data, selections, preferences, and the like, which are entered by the caller using an input device, such as touch-tone keys on a phone. Such non-verbal inputs may also include data, selections, preferences, and the like, that are retrieved from other sources. In one embodiment, non-verbal inputs are retrieved from a database or other data source using caller ID information or other information that indicates the source of a call.

The method proceeds to block **208**, where the IVR processes one or more non-verbal inputs. In a particular embodi-

ment, the IVR can process the non-verbal input or inputs, by assigning a value to an action-object, an additional value to an additional action-object, and so on. In a particular embodiment, each value assigned at block **208** is derived from at least one of the retrieved non-verbal inputs. The process may continue, until certain values, or all possible values, are derived from the non-verbal input or inputs. From block **208**, the method may return to decision step **204**, and the IVR or other program determines whether to retrieve additional non-verbal inputs. If the IVR or other program determines not to retrieve any non-verbal inputs, or any additional non-verbal inputs, the method proceeds to block **210**. In an illustrative embodiment, the IVR may process each non-verbal input as it is received. In another illustrative embodiment, the IVR may process each non-verbal input after multiple non-verbal inputs have been received. In another illustrative embodiment, the IVR may process each non-verbal input after the IVR or other program determines to retrieve no additional non-verbal input.

Returning to block **210**, the IVR prompts the caller for one or more verbal inputs. The method proceeds to decision step **212**, and the IVR determines whether it has received verbal inputs from the caller. If the IVR determines that it has not received verbal inputs for which it has prompted the caller, the method proceeds to block **214**. The IVR may determine to end the call due to lack of response by the caller, in which case the method terminates at **226**. Alternatively, the IVR may determine to prompt the caller again, in which case the method returns to step **210**.

After one or more verbal inputs are received, the method proceeds to block **216** and the IVR processes each verbal input. In a particular embodiment, the IVR can process the verbal input or inputs by assigning a first value to at least one first action-object, a next value to a next action-object, and so on. Each value assigned, at block **216**, is derived from at least one of the received verbal inputs.

In a particular embodiment, the method proceeds to decision step **218** and the IVR or other program may determine whether to request additional verbal inputs. If the IVR, or other program, determines to request additional verbal inputs, the method returns to step **210** and the caller is prompted for one or more additional verbal inputs. If the IVR, or other program, determines not to retrieve any additional verbal inputs, the method proceeds to block **220**. In an illustrative embodiment, the IVR may process each verbal input as it is received. In another illustrative embodiment, the IVR may process each verbal input after multiple verbal inputs have been received. In another illustrative embodiment, the IVR may process each verbal input after the IVR or other program determines to retrieve no additional verbal inputs.

As shown at block **220**, the IVR retrieves content from an information store. In a particular embodiment, the information store is logically external to the IVR. Further, a plurality of portions of content is stored at the information store, and each portion of content is associated with one or more action-objects and one or more action-object values. In a particular embodiment, the IVR retrieves content associated with one or more action-objects and the values assigned to those action-objects, based on the verbal inputs received and processed. In a particular embodiment, the IVR may further retrieve content associated with one or more action-objects and the values assigned to those action-objects, based on non-verbal inputs.

Moving to block **222**, the IVR may communicate content retrieved from the information store, to the caller. Moreover, the content can be communicated to the caller over a network connected with the server, and via a telephony device used by the caller.

In a particular embodiment, the content stored in the information store comprises audio content. The content is further described with reference to FIG. 5.

Proceeding to decision step 224, the IVR, or other program, determines whether to retrieve additional content. If the IVR, or other program, determines to retrieve additional content, the method returns to step 220.

In a particular embodiment, the IVR may retrieve portions of content from the information store by submitting one or more queries to the information store. In a particular embodiment, each query may include one or more action-object names and a value for each action-object, which is derived from one or more verbal inputs. In another particular embodiment, each query may comprise more than one value and more than one action-object. Moreover, in a particular embodiment, at least one of the values can be derived from one or more non-verbal inputs.

In an illustrative embodiment, the content stored at the information store may be audio content or non-audio content. The non-audio content can be converted to audio content by the IVR so that it may be communicated to the caller. In an illustrative embodiment, the content can include table-driven instructional content.

Returning to decision step 224, if the IVR or other program determines not to retrieve additional content, the method ends at 226.

Referring to FIG. 3, an alternative method to access content in a speech-enabled automated system is shown and commences at block 300. At block 300, content is stored at an information store. In a particular embodiment, a plurality of portions of content is stored at the information store. Further, each portion of content is associated with one or more action-objects and one or more action-object values. An example of an information store is described further with reference to FIG. 5.

At block 302, the information store receives one or more queries from an interactive voice response system (IVR). The information store is logically external to the IVR. In one embodiment, a query may include at least one action-object name and at least one value derived from one or more verbal inputs. In another embodiment, the query may comprise at least one action-object name, at least one value derived from a verbal input, and at least one value derived from a non-verbal input.

In a particular embodiment, the method may proceed to decision step 304, and the information store determines whether content is being modified. If the information store determines that no content is being modified, the method proceeds to block 310 and the next query is processed. Conversely, if the information store determines that content is being modified, the method proceeds to decision step 306. At decision step 306, the information store determines whether to suspend processing of the next query. If the information store determines not to suspend processing of the next query, the method proceeds to block 310. If the information store determines to suspend processing, the method proceeds to block 308, where content is modified before one or more queries are processed. In an illustrative embodiment, processing of queries can be suspended until all content in the information store is modified. In another illustrative embodiment, processing of queries can be suspended until the content related to one or more of the received queries is modified.

At block 310, the next query is processed. In an illustrative embodiment, queries may be maintained in a queue and processed individually. In another illustrative embodiment, multiple queries may be processed concurrently.

In a particular embodiment, the information store may process one or more queries by searching one or more records within the information store and retrieving one or more portions of the content from the record(s).

Once the information store has processed one or more queries, the method proceeds to block 312. The information store communicates content associated with the action-object names and values of each query to the IVR. In a particular embodiment, the method proceeds to decision step 314, and the information store determines whether any unprocessed queries remain. If unprocessed queries remain, the method returns to block 310 and the next query or queries are processed. If no unprocessed queries remain, the method terminates at block 316.

Referring to FIG. 4, an example of a table-driven state table is shown and generally designated at 400. In a particular embodiment, the table-driven state table may include a header section 402 that identifies products or services for which the table-driven state table 400 is designed to receive verbal inputs, return content, or both. In this particular embodiment, the header section 402 may further include the purpose of the table-driven state table 400. For example, the header section 402 may state that the table-driven state table 400 is designed to gather one or more services (Call Waiting, Personalized Ring, Priority Call, etc.), in which the caller is interested, and the particular actions (turn on, turn off, pricing, etc.) that the caller wishes to perform regarding the services. The header section 402 may also indicate whether the system is to elicit verbal inputs, to set action-objects, or return content to the caller, or whether it is designed for other purposes.

As illustrated in FIG. 4, the table-driven state table 400 can include an audio section 404 that includes the structure 406 of audio that is communicated to a caller. The audio section 404 may include the structure 406 of prompts, content, or both. In a particular embodiment, the structure 406 of the audio can include fields, where content from an information store is inserted prior to communication to the caller. In an illustrative embodiment, the audio section 404 of the table-driven state table 400 includes a plurality of initial voice prompts. The audio section 404 may separate prompts by type and name and defines structures 406 for the wording of each prompt. Specific wording may be received from an information store and inserted into the fields, as needed. For example, the structure of wording for the Initial Prompt named "4460.ini" can state: "Please choose from one of the following topics:". Rather than listing the topics from which a caller may choose in the wording of the audio section 404, the listing of topics is replaced with field <OBJECT_INITIAL>. An audio version of the list may be retrieved and/or compiled from an information store and inserted dynamically into the audio prompt at the position of the designed field.

FIG. 4 indicates that the table-driven state table 400 also includes a logic section 408. The logic section 408 can include a plurality of potential verbal inputs 410 that may be received from a caller and rules 412 for assigning values to action-objects based on the verbal inputs 410 received. In the illustrative embodiment shown in FIG. 4, the verbal inputs 410 include vocabulary that may be received from a caller in response to prompts communicated based on the audio section 404. The logic section 408 can relate the vocabulary to various call selection options 414 that are cited in the header section 402. The logic section 408 also contains logic to assign values to action-objects, based on the vocabulary of the verbal inputs 410 received from callers. For example, if a caller states that the content desired relates to "Turning off a Named Service," then a value of "Turnoff-NamedService"

may be assigned to one or more action-objects. Likewise, if the caller states “How much does it cost?”, a value of “RatePlan-NamedService” may be assigned to one or more action-objects.

It is to be understood that an action-object is a parameter with which content in an information store may be associated. Each action-object may comprise an action, such as “Power-Down”; an object, such as “Device”; a location, such as “Texas”; a language, such as “English”; or combinations of these, such that values of different action-objects may be combined dynamically. Additionally, other values derived from verbal inputs may be subsumed in any action-object, or within their own action-objects. For example, where location or language changes the content communicated to a caller, example action-object values may comprise “PowerDown,” “Device,” “Texas,” “Spanish,” or combinations thereof, such as “PowerDown-Device,” “Texas-Spanish,” “PowerDown Device-Texas-Spanish,” and the like.

In a particular embodiment, one or more values may be assigned to one or more action-objects based on each verbal input. In another embodiment, each verbal input may be used to assign a single value to a single action-object pair.

In a particular embodiment, a separate table-driven state table is used to assign values to action-objects based on non-verbal inputs. In another embodiment, one or more table-driven state tables may be used to assign values to action-objects based on verbal and non-verbal inputs.

In a particular embodiment, the table-driven state table can include a confirmation section **416**. The confirmation section **416** can contain wording of a plurality of confirmation prompts to confirm that the system has understood the verbal inputs received from the caller. The confirmation section can relate the options **414** of the logic section **408** to the wording **418** of related confirmation prompts. By confirming verbal inputs, the system may correctly assign values to action-objects according to the rules of the logic section **408**.

Referring to FIG. 5, an example of a content record in an information store is shown and designated generally at **500**. The record **500** illustrates an example of associations between action-objects, values, and content within an information store. These associations may be present in an information store, whether or not the information store utilizes records. In the illustrative embodiment shown in FIG. 5, a first portion of the content **504** is associated with a first action-object **502**, named “Purpose.” The content **504** can vary according to values of the first action-object. For example, if the value of the first-action object **502** is “Call Notes Setup *1a*,” the content **504** that is communicated to the caller as audio instructional content may comprise:

Here’s how you do it. First, to access your Call Notes, pick up the phone and dial your home phone number—even if you’re dialing from your home phone. If you live in an area where 10-digit calling is required, you’ll need to include your area code. Next, press the star key, when you hear the Call Notes greeting.

In the illustrative embodiment shown in FIG. 5, a second portion of the content **504** is associated with a second action-object **506**, named “Language.” The content **504** can vary according to values of the first action-object and the second action-object. For example, the content **504** regarding accessing a voice mail service may be selected based on the value of the first action-object **502** is “Call Notes Setup *1a*,” and the content may be translated into Spanish or Mandarin Chinese, if the value of the second action-object **506** is “Spanish” or “Mandarin.”

In the illustrative embodiment shown in FIG. 5, a third portion of the content **504** is further associated with a second

action-object **508**, named “State.” The content **504** can vary according to values of the first action-object and the second action-object. For example, content **504** regarding setting up a voice mail service may vary depending on whether the value of the first action-object is “Call Notes Setup *1a*” and the instructions for that action may vary, based on whether the value of the second action-object **508** is “Texas” or “Arkansas.”

Referring to FIG. 6, an illustrative embodiment of a general computer system is shown and is designated **600**. The computer system **600** can include a set of instructions that can be executed to cause the computer system **600** to perform any one or more of the methods or computer based functions disclosed herein. The computer system **600** may operate as a standalone device or may be connected, e.g., using a network, to other computer systems or peripheral devices.

In a networked deployment, the computer system may operate in the capacity of a server or as a client user computer in a server-client user network environment, or as a peer computer system in a peer-to-peer (or distributed) network environment. The computer system **600** can also be implemented as or incorporated into various devices, such as a personal computer (PC), a tablet PC, a set-top box (STB), a personal digital assistant (PDA), a mobile device, a palmtop computer, a laptop computer, a desktop computer, a communications device, a wireless telephone, a land-line telephone, a control system, a camera, a scanner, a facsimile machine, a printer, a pager, a personal trusted device, a web appliance, a network router, switch or bridge, or any other machine capable of executing a set of instructions (sequential or otherwise) that specify actions to be taken by that machine. In a particular embodiment, the computer system **600** can be implemented using electronic devices that provide voice, video or data communication. Further, while a single computer system **600** is illustrated, the term “system” shall also be taken to include any collection of systems or sub-systems that individually or jointly execute a set, or multiple sets, of instructions to perform one or more computer functions.

As illustrated in FIG. 6, the computer system **600** may include a processor **602**, e.g., a central processing unit (CPU), a graphics processing unit (GPU), or both. Moreover, the computer system **600** can include a main memory **604** and a static memory **606** that can communicate with each other via a bus **608**. As shown, the computer system **600** may further include a video display unit **610**, such as a liquid crystal display (LCD), an organic light emitting diode (OLED), a flat panel display, a solid state display, or a cathode ray tube (CRT). Additionally, the computer system **600** may include an input device **612**, such as a keyboard, and a cursor control device **614**, such as a mouse. The computer system **600** can also include a disk drive unit **616**, a signal generation device **618**, such as a speaker or remote control, and a network interface device **620**.

In a particular embodiment, as depicted in FIG. 6, the disk drive unit **616** may include a computer-readable medium **622** in which one or more sets of instructions **624**, e.g. software, can be embedded. Further, the instructions **624** may embody one or more of the methods or logic as described herein. In a particular embodiment, the instructions **624** may reside completely, or at least partially, within the main memory **604**, the static memory **606**, and/or within the processor **602** during execution by the computer system **600**. The main memory **604** and the processor **602** also may include computer-readable media.

In an alternative embodiment, dedicated hardware implementations, such as application specific integrated circuits, programmable logic arrays and other hardware devices, can

be constructed to implement one or more of the methods described herein. Applications that may include the apparatus and systems of various embodiments can broadly include a variety of electronic and computer systems. One or more embodiments described herein may implement functions using two or more specific interconnected hardware modules or devices with related control and data signals that can be communicated between and through the modules, or as portions of an application-specific integrated circuit. Accordingly, the present system encompasses software, firmware, and hardware implementations.

In accordance with various embodiments of the present disclosure, the methods described herein may be implemented by software programs executable by a computer system. Further, in an exemplary, non-limited embodiment, implementations can include distributed processing, component/object distributed processing, and parallel processing. Alternatively, virtual computer system processing can be constructed to implement one or more of the methods or functionality as described herein.

The present disclosure contemplates a computer-readable medium that includes instructions 624 or receives and executes instructions 624 responsive to a propagated signal, so that a device connected to a network 626 can communicate voice, video or data over the network 626. Further, the instructions 624 may be transmitted or received over the network 626 via the network interface device 620.

While the computer-readable medium is shown to be a single medium, the term “computer-readable medium” includes a single medium or multiple media, such as a centralized or distributed database, and/or associated caches and servers that store one or more sets of instructions. The term “computer-readable medium” shall also include any medium that is capable of storing, encoding or carrying a set of instructions for execution by a processor or that cause a computer system to perform any one or more of the methods or operations disclosed herein.

In a particular non-limiting, exemplary embodiment, the computer-readable medium can include a solid-state memory such as a memory card or other package that houses one or more non-volatile read-only memories. Further, the computer-readable medium can be a random access memory or other volatile re-writable memory. Additionally, the computer-readable medium can include a magneto-optical or optical medium, such as a disk or tapes or other storage device to capture carrier wave signals such as a signal communicated over a transmission medium. A digital file attachment to an e-mail or other self-contained information archive or set of archives may be considered a distribution medium that is equivalent to a tangible storage medium. Accordingly, the disclosure is considered to include any one or more of a computer-readable medium or a distribution medium and other equivalents and successor media, in which data or instructions may be stored.

In accordance with various embodiments, the methods described herein may be implemented as one or more software programs running on a computer processor. Dedicated hardware implementations including, but not limited to, application specific integrated circuits, programmable logic arrays and other hardware devices can likewise be constructed to implement the methods described herein. Furthermore, alternative software implementations including, but not limited to, distributed processing or component/object distributed processing, parallel processing, or virtual machine processing can also be constructed to implement the methods described herein.

It should also be noted that software that implements the disclosed methods may optionally be stored on a tangible storage medium, such as: a magnetic medium, such as a disk or tape; a magneto-optical or optical medium, such as a disk; or a solid state medium, such as a memory card or other package that houses one or more read-only (non-volatile) memories, random access memories, or other re-writable (volatile) memories. The software may also utilize a signal containing computer instructions. A digital file attachment to e-mail or other self-contained information archive or set of archives is considered a distribution medium equivalent to a tangible storage medium. Accordingly, the disclosure is considered to include a tangible storage medium or distribution medium as listed herein, and other equivalents and successor media, in which the software implementations herein may be stored.

Although the present specification describes components and functions that may be implemented in particular embodiments with reference to particular standards and protocols, the invention is not limited to such standards and protocols. For example, standards for Internet and other packet switched network transmission (e.g., TCP/IP, UDP/IP, HTML, HTTP) represent examples of the state of the art. Such standards are periodically superseded by faster or more efficient equivalents having essentially the same functions. Accordingly, replacement standards and protocols having the same or similar functions as those disclosed herein are considered equivalents thereof.

The illustrations of the embodiments described herein are intended to provide a general understanding of the structure of the various embodiments. The illustrations are not intended to serve as a complete description of all of the elements and features of apparatus and systems that utilize the structures or methods described herein. Many other embodiments may be apparent to those of skill in the art upon reviewing the disclosure. Other embodiments may be utilized and derived from the disclosure, such that structural and logical substitutions and changes may be made without departing from the scope of the disclosure. Additionally, the illustrations are merely representational and may not be drawn to scale. Certain proportions within the illustrations may be exaggerated, while other proportions may be minimized. Accordingly, the disclosure and the figures are to be regarded as illustrative rather than restrictive.

One or more embodiments of the disclosure may be referred to herein, individually and/or collectively, by the term “invention” merely for convenience and without intending to voluntarily limit the scope of this application to any particular invention or inventive concept. Moreover, although specific embodiments have been illustrated and described herein, it should be appreciated that any subsequent arrangement designed to achieve the same or similar purpose may be substituted for the specific embodiments shown. This disclosure is intended to cover any and all subsequent adaptations or variations of various embodiments. Combinations of the above embodiments, and other embodiments not specifically described herein, will be apparent to those of skill in the art upon reviewing the description.

The Abstract of the Disclosure is provided to comply with 37 C.F.R. §1.72(b) and is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims. In addition, in the foregoing Detailed Description, various features may be grouped together or described in a single embodiment for the purpose of streamlining the disclosure. This disclosure is not to be interpreted as reflecting an intention that the claimed embodiments require more features than are expressly recited in each claim. Rather,

13

as the following claims reflect, inventive subject matter may be directed to less than all of the features of any of the disclosed embodiments. Thus, the following claims are incorporated into the Detailed Description, with each claim standing on its own as defining separately claimed subject matter. 5

The above disclosed subject matter is to be considered illustrative, and not restrictive, and the appended claims are intended to cover all such modifications, enhancements, and other embodiments, which fall within the true spirit and scope of the present invention. Thus, to the maximum extent 10 allowed by law, the scope of the present invention is to be determined by the broadest permissible interpretation of the following claims and their equivalents, and shall not be restricted or limited by the foregoing detailed description.

What is claimed is:

1. A method of accessing content at a speech-enabled automated system, the method comprising:

receiving a verbal input at an interactive voice response system; and

accessing an information store to retrieve content based on the verbal input, wherein the information store determines whether to suspend retrieval of the content until the content is available when information store content of the information store is being modified and modifications to the information store content could influence 20 retrieval of the content, and wherein the information store is logically external to the interactive voice response system.

2. The method of claim **1**, further comprising communicating a prompt to a caller prior to receiving the verbal input. 30

3. The method of claim **1**, further comprising: determining a first action-object and an associated first value based on the verbal input; and retrieving content associated with the first value from the information store. 35

4. The method of claim **1**, further comprising: receiving a non-verbal input; determining a second action-object and an associated second value based on the non-verbal input; and retrieving content associated with the second value from 40 the information store.

5. The method of claim **3**, further comprising: determining a next action-object and an associated next value based on the verbal input; and retrieving content associated with the next value from the information store. 45

6. The method of claim **4**, further comprising: determining an additional action-object and an associated additional value based on the non-verbal input; and retrieving content associated with the additional value 50 from the information store.

7. The method of claim **1**, further comprising submitting a query to the information store.

8. The method of claim **1**, further comprising communicating the content retrieved from the information store to a caller. 55

9. A method of providing content at a speech-enabled automated system, the method comprising:

storing a plurality of content items at an information store, wherein each of the plurality of content items is associated with an action-object; 60

receiving a query at the information store from an interactive voice response system, wherein the information store is logically external to the interactive voice response system;

determining whether a modification of content is in progress at the information store;

14

determining, when the modification is in progress, whether to suspend processing of the query until the modification is complete; and

processing the query after the modification is complete, in response to a determination to suspend the processing of the query.

10. The method of claim **9**, wherein each action-object comprises a parameter chosen from a group consisting of a desired action, a call purpose, a product, a service, a location, a language, and any combination thereof.

11. The method of claim **10**, wherein the content items relate to a service chosen from a group consisting of call notes, voice mail, call blocking, privacy management, call tracing, call return, auto-redial, call forwarding, call waiting, direct reply, caller ID, and remote access. 15

12. The method of claim **9**, wherein the query comprises a particular action-object having a value that is derived from a verbal input received at the interactive voice response system.

13. The method of claim **12**, wherein the query comprises a particular action-object having a value that is derived from a non-verbal input received at the interactive voice response system.

14. The method of claim **9**, further comprising: providing an answer to the interactive voice response system, wherein the answer is used as part of a response to a caller by the interactive voice response system.

15. The method of claim **9**, further comprising: searching at least one record at the information store for at least one of the plurality of content items; retrieving, from the at least one record at the information store, the at least one of the plurality of content items; and 25

communicating the at least one of the plurality of content items to the interactive voice response system.

16. The method of claim **9**, wherein each of the plurality of content items comprises table-driven instructional content.

17. A system of managing content at a speech-enabled automated system, the system comprising:

a server, wherein the server comprises:

a processor;

a memory accessible to the processor; and

an interactive voice response system embedded within the memory, wherein the interactive voice response system comprises:

instructions executable by the processor to process a verbal input; and

instructions executable by the processor to access an information store that is external to the interactive voice response system to retrieve content, wherein the content retrieved from the information store is associated with the verbal input, and wherein the information store determines whether to suspend retrieval of the content until the content is available when information store content of the information store is being modified and modifications to the information store content could influence retrieval of one or more fields of the content.

18. The system of claim **17**, wherein the server further comprises an interface to communicate with a communications network.

19. The system of claim **18**, wherein the communications network comprises a network chosen from a group consisting of a public switched telephone network, a Voice-over-Internet Protocol network, a cellular telephone network, a mobile telephone network, and combinations thereof. 65

20. The system of claim **17**, wherein the information store further comprises a plurality of content items, and wherein

15

each of the plurality of content items is associated with at least one action-object and at least one value.

21. The system of claim **20**, wherein the information store further comprises:

computer-readable instructions to search at least one record at the information store for at least one of the plurality of content items; and

computer-readable instructions to retrieve, from the at least one record, the at least one of the plurality of content items.

22. A computer-readable storage device comprising instructions that, when executed by a processor, cause the processor to perform operations comprising:

processing a verbal input from a caller;

accessing an information store that is logically external to the computer-readable storage device to retrieve content based on at least one query, wherein the at least one query is associated with the verbal input, and wherein the information store determines whether to suspend processing of the at least one query until the content is available when information store content of the information store is being modified and modifications to the information store content could influence an answer to the at least one query; and

receiving the answer to the at least one query, wherein the answer is used as part of a response to the caller.

23. The computer-readable storage device of claim **22**, wherein the operations further comprise communicating a prompt to the caller prior to receiving the verbal input.

24. The computer-readable storage device of claim **22**, wherein the operations further comprise:

determining a first action-object and a first value associated with the first action-object, wherein the first value is derived from the verbal input; and

retrieving content associated with the first value.

25. The non transitory computer-readable storage device of claim **22**, wherein the operations further comprise:

16

instructions that, when executed by the processor, cause the processor to process a non-verbal input;

instructions that, when executed by the processor, cause the processor to determine a second action-object and a second value associated with the second action-object, wherein the second value is derived from the non-verbal input; and

instructions that, when executed by the processor, cause the processor to retrieve content associated with the second value.

26. The computer-readable storage device of claim **24**, wherein the operations further comprise:

instructions that, when executed by the processor, cause the processor to determine a next action-object and a next value associated with the next action-object, wherein the next value is derived from the verbal input; and

instructions that, when executed by the processor, cause the processor to retrieve content associated with the next value.

27. The computer-readable storage device of claim **25**, wherein the operations further comprise:

instructions that, when executed by the processor, cause the processor to determine an additional action-object and an additional value associated with the additional action-object, wherein the additional value is derived from the verbal input; and

instructions that, when executed by the processor, cause the processor to retrieve content associated with the additional value.

28. The computer-readable storage device of claim **22**, wherein the operations further comprise submitting the at least one query to the information store.

29. The computer-readable storage device of claim **22**, wherein the operations further comprise communicating the response to the caller.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 8,526,577 B2
APPLICATION NO. : 11/212939
DATED : September 3, 2013
INVENTOR(S) : Julie A. Idler et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims, Column 15, Claim 25, Line 1, "The non transitory computer-readable storage device of" should read --The computer-readable storage device of--.

Signed and Sealed this
Fourth Day of March, 2014



Michelle K. Lee
Deputy Director of the United States Patent and Trademark Office

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 8,526,577 B2
APPLICATION NO. : 11/212939
DATED : September 3, 2013
INVENTOR(S) : Julie A. Idler et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims, Column 15, Claim 25, Line 36, "The non transitory computer-readable storage device of" should read --The computer-readable storage device of--.

This certificate supersedes the Certificate of Correction issued March 4, 2014.

Signed and Sealed this
Twenty-fifth Day of March, 2014



Michelle K. Lee
Deputy Director of the United States Patent and Trademark Office